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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JULY 8, 1933

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Edited by WATSON DAVIS

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DO YOU KNOW?

The wings of a common house fly vibrate 330 times a second.

About half the insects of the world are harmful to man, and the other half render him a service.

Sixteenth century apothecaries made oil out of earthworms as a rubbing remedy for rheumatism.

It is predicted that dental fillings of the future will be non-metallic, chemically inert, and natural-looking.

A new commercial process for canning tomato juice is reported to be simple and to result in no loss of Vitamin C.

Paris has a house made of translucent glass three inches thick, the walls of which are cleaned by an automatic sprinkler system.

A nutritionist points out that, while rhubarb is scientifically classed as a vegetable, it is very properly used as a fruit in balancing the diet.

Sulfuric acid, cheapest and most important acid in the chemical industry, may be replaced in its distinction by phosphoric acid made by a new process.

If man could jump as far in comparison to his own weight as a California flea, he could reach the moon in ten jumps.

Gold crystals, the rarest form of gold, have been placed on exhibit at the Academy of Natural Sciences of Philadelphia.

Both ultraviolet rays and infra-red rays pass through porous fabrics such as wool more easily than through other materials.

Archaeologists exploring the old market place of Athens found in two months 7,600 coins, many of them lost in dirt floors of the ancient city.

The "greatest river in the world" is a counter equatorial current in the Pacific which flows about ten degrees north and parallel to the equator.

Four crested rats, the first ever exhibited in captivity, have come to the London Zoo from Kenya, and a single young one has been born there.

Workers should not live more than three or four miles from their work, says an economist who studied accounts of 267 families who moved outside a city to save money.

WITH THE SCIENCES THIS WEEK

ARCHAEOLOGY

Where did idols wear polka-dot trousers? p. 31.

ASTRONOMY

Can life exist on Mars? p. 27. *Astronomy—Forest Ray Moulton—Macmillan, 1931, \$3.75.*

Where will America's third Planetarium be located? p. 29.

BACTERIOLOGY

What causes decay of stone? p. 20.

BOTANY

How large is the world's oldest tree? p. 21.

CHEMISTRY

What precautions are being taken in the new Government archives building to protect documents from air impurities? p. 25.

ETHNOLOGY

Where did the southern negroes get their peculiarities of speech? p. 29.

EVOLUTION

When was the earth's first depression? p. 22. *Plant Life Through the Ages—A. C. Seward—Macmillan, 1931, \$10.00.*

GENERAL SCIENCE

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HEREDITY

How large is a gene? p. 24.

METEOROLOGY

Can study of the sun aid in forecasting the earth's weather? p. 25. *World Weather—Henry Helm Clayton—Macmillan, 1923, \$4.*

PALEONTOLOGY

What type of diet did a dinosaur eat? p. 19. *Paleontology—Edward Wilber Berry—McGraw-Hill, 1929, \$3.50.*

PHYSICS

For whom may the new-found positive electron be named? p. 24.

How many radio-reflecting layers are there? p. 19.

PHYSIOLOGY

How does vitamin A prevent stomach ulcers? p. 20.

PSYCHOLOGY

How does punishment tend to break up the family? p. 28.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

PHYSICS

New Electric Roof of World Found by American Physicists

**Discovery Delayed by Shielding of Lower Electrified Layer
Marconi Expects to Locate Roof Higher Than Any Known**

FURTHER light has been thrown on the "electric roof of the world"—the electrically charged layers of the upper atmosphere which reflect wireless waves and render possible long distance radio transmission—by the researches of J. P. Schafer and W. M. Goodall of the Bell Telephone Laboratories, Deal, New Jersey.

Two reflecting layers are known, one at a height of 100 to 120 kilometers, and another somewhere between 190 to 300 kilometers. In the course of recent experiments, the New Jersey physicists have found an intermediate layer at an average height of 150 kilometers, from which wireless waves are reflected. (A kilometer is about six-tenths of a mile.)

They state, in a communication to *Nature*, that the reason why this intermediate electric "roof" had not been detected before is because it is shielded by the lower layer and only occasionally does its electrical or ionic density become greater than that of the lower layer, so as to enable its detection. Even then, it is necessary that the frequency of the radio waves be just great enough to permit penetration of the lower region and yet small enough to give reflection from the new layer.

Not One But Several

Another important fact discovered by Messrs. Schafer and Goodall is that the upper reflecting layer really consists of several layers though its exact structure varies at different times.

It is understood that Marconi is contemplating the discovery of a still higher reflecting "roof." He is led to believe that such a layer must exist, by his experiments with very short radio waves of 40 to 60 centimeters wavelength. With these ultra-short wavelengths, contrary to what might have been expected, Marconi has already been able to communicate over distances up to 170 kilometers. These ultra-short waves pass through all the electric layers in the upper atmosphere, so far known, and their long distance range may be due

to reflection from a higher and more highly ionized layer.

The practical importance of ultra-short radio waves is very great, because they are not interfered with by atmospheric conditions. Knowledge of the conditions which would render them available for long-distance telephony is therefore extremely valuable.

The existence of the new layer has been confirmed at two places in England. Prof. E. V. Appleton of King's College, London, and J. A. Ratcliffe and E. L. C. White of the Cavendish Laboratory, Cambridge, writing independently to *Nature*, state that they have also detected an intermediate electrical layer that reflects radio waves.

The electrical strength (ionization) of this layer is, however, smaller at

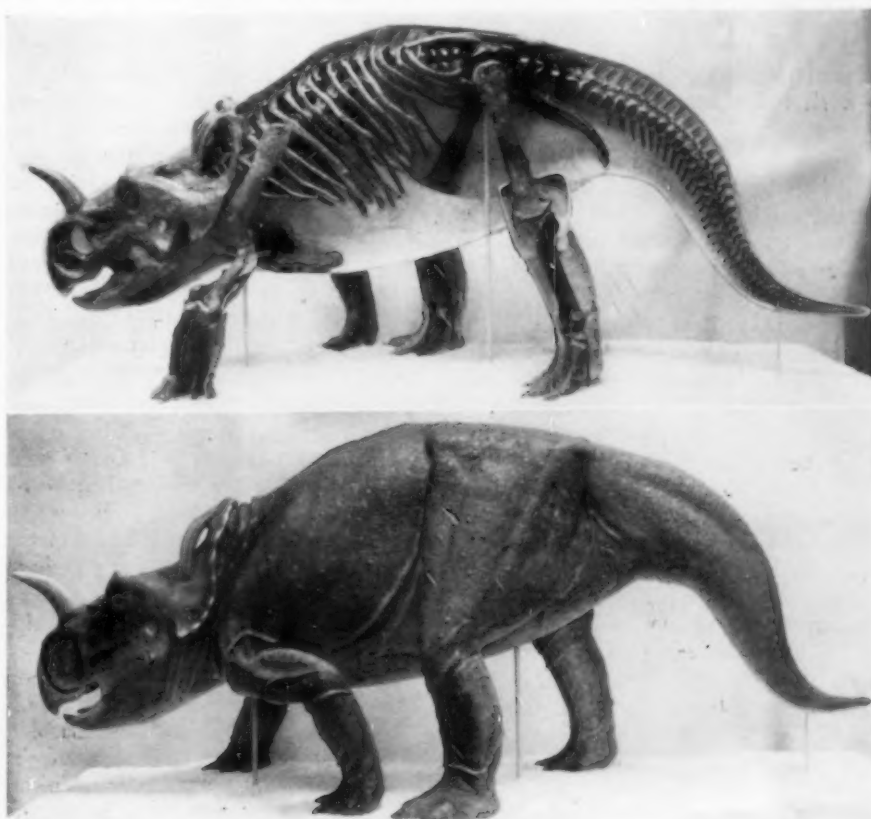
noon than in the early morning, and in this respect it differs from the American electric "roof." Prof. Appleton further agrees that the upper layer, which bears his name, is probably composite. He considers that from the latest data one may deduce the existence of four reflecting layers in the ionosphere. The Kennelly-Heaviside layer, 100 to 120 kilometers, is the lowest; next at about 150 kilometers height, comes the newly discovered layer of Schafer and Goodall and then between 190 and 300 kilometers the Appleton region consisting of at least two layers. Senator Marconi, then, is searching for a fifth radio roof of the world beyond the Appleton region.

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PALEONTOLOGY

Dinosaur is Restored Internally and Externally

BEAKED like a tortoise, horned like a rhinoceros, its muscles and skin skillfully restored by anatomists, a twenty-foot dinosaur has just been placed on exhibition in the Peabody Museum of Natural History at Yale University. The monster is of the genus known to paleontologists as *Monoclonius*, and it



INSIDE AND OUT

lived a hundred million years ago, more or less, in the Cretaceous age.

The skeleton around which the restoration has been built was collected in the Red Deer region of Alberta, Canada, by Barnum Brown of the American Museum of Natural History, and was purchased by the Peabody Museum. Almost all the bones were recovered.

When the skeleton was assembled at the Peabody Museum it was placed in a walking posture, its feet set to match certain three-toed dinosaur tracks on slabs of rock in the region where it was found; these tracks may possibly have been made by the same or a similar species.

Leaves Framework Visible

The restoration of flesh and skin was undertaken for one side only, leaving the bony framework visible from the other side. The mount thus gives a graphic illustration of how scientists reconstruct the probable living appearance of a long-extinct animal.

Each muscle was modeled separately in plasteline, thus building up the entire contour of the head, body, limbs and tail. Part of a *Monoclonius* skin has been recovered, and is now in the American Museum of Natural History. Using this as a pattern, a mould was prepared, showing the studding of small bony plates that apparently gave the creature a partial armoring. Into this the plastic materials for the skin were pressed.

Reptile Color

After the restored skin was mounted on the specimen, the whole creature was painted a sort of general "reptile color," following the hues of animals of that class living today, but without imitating any particular one of them.

Monoclonius, in spite of his formidable appearance, was a vegetarian, and probably not at all fierce. The wide frill that projected from the edge of his skull over the back of his neck afforded that vital region some protection, and possibly his forward-projecting horn could be used as a defensive weapon. There were four additional horn-like appendages to the bony skull-frill, whose usefulness, if any, has not been determined.

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The great Nassak diamond, from the eye of the god Siva in an Indian temple, is now in a cabinet so protected that a blow to the glass case causes the gem to sink into a drill-proof safe and at the same time a flood of tear gas is released.

BACTERIOLOGY

Scientists Isolate Bacteria That Cause Stone Decay

Inoculation of New Structures Expected to Produce Castles Centuries Old in Just a Few Years

AMERICAN millionaires who were wont to import picturesquely mouldering English castles and abbeys and plant them on their country estates will not need to pursue that strange traffic any more—that is, supposing any representatives of that curious genus survived the Great Ice Age of 1929. Thanks to the researches of four English scientists, they will be able to build their castles out of new stone, inoculate them with the right kind of germs, and in a short time have them in as venerable a state of decay as though they had been standing in an English drizzle since the Wars of the Roses.

The current *Philosophical Transactions* of the Royal Society of London contain a study of the relationship of micro-organisms to the decay of stone by Sydney G. Paine, Frank V. Lingood, Freda Schimmer and Thomas C. Thrupp. It might, in fact, be termed a study of the bacterial diseases of building stones. This team of scientists have isolated not less than 58 strains of bacteria from decaying stone, have planted cultures of some of them on new stone fresh from the quarry, and have made at least a good beginning of an understanding of the means by which bacteria help to ruin building materials.

The stones they examined came from some of England's most ancient edifices; castles whence crusaders once rode, abbeys antedating the Reformation, London buildings erected by Christopher Wren. Bacteria were found not only on their surfaces, but buried in their hearts as much as two feet deep. The organisms appear to be related to those of the soil, yet they constitute in a way a micro-flora of their own.

Physiologically, two things are significant about their biology. Many of the strains isolated produce carbon dioxide, and carbon dioxide is a chemical enemy of all limestones and marbles. There were also several strains of the bacteria that are able to oxidize sulphur, getting at least a part of their energy-food out of the element, indigestible to

higher organisms. That means that such bacteria will weaken any rock in which sulphur or sulphur compounds form any significant part; it constitutes them an especial enemy of any plaster or stucco containing gypsum, which is calcium sulphate.

But that is not the only, or indeed the chief, capacity for trouble possessed by these sulphur-eating bacteria. The investigators found that their cells secrete a mucilage-like stuff, which accumulated in the pores of the rock. Now mucilage, or any similar colloid, soaks up water when it gets a chance and swells most amazingly, and in swelling exerts a force little short of explosive in its disruptive power, even though it makes no great bang or fuss about it. Bacterially deposited mucilage beneath the face of a stone could easily split off flakes year after year, until in the course of time you would have as dilapidated a ruin as any nineteenth-century novelist could wish.

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PHYSIOLOGY

Stomach Ulcers May Result From Lack of Vitamin A

EVIDENCE that stomach ulcers may result from diets lacking in vitamin A was presented to the American Society for Experimental Pathology by Dr. Ira A. Manville of the University of Oregon Medical School.

Dr. Manville reported that white rats fed a diet deficient in vitamin A developed stomach ulcers and erosions. Nearly two-thirds of all the animals fed on diets that were deficient to various degrees in the vitamin showed these sores. As the vitamin deficiency became more severe, the number of animals affected became greater until nearly 100 per cent. were found to have ulcers.

Vitamin A, found in liver, butter, egg yolk, cheese, cod liver oil, spinach and the leaves of plants, is necessary to promote normal growth. In its absence growth is stunted and a severe

eye disease develops. This vitamin is also considered necessary for normal functioning of the mucous membrane of nose, throat and breathing apparatus, and urinary and gastro-intestinal tracts. In this connection it has been claimed that vitamin A prevents colds.

It is in its effect on the mucous membrane of the stomach that Dr. Manville believes vitamin A is concerned in the formation of stomach ulcers. According to modern theory, stomach ulcers are formed when the acid normally present in the stomach is able to penetrate the lining of the stomach and so eat away part of the stomach wall. It is considered not so much a question of too much acid in the stomach as of a lessening or absence of factors that normally neutralize the acid.

In Dr. Manville's opinion, the mucous lining of the stomach acts as a protective device against the acid's action. Since vitamin A is necessary for the well-being of this mucous lining, he reasoned that ulcers might develop when the vitamin was lacking in the diet. Investigations with animals fed on diets that had little or no vitamin A seem to have borne out his theory.

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SOCIOLOGY

Values of Family Life In Soviet Challenged

THE "COLLECTIVIZED" family, common to apartment-housed American industrial communities and the deliberately planned Soviet social system, was sharply challenged by Dr. Dwight Sanderson of Cornell University in a discussion before the American Sociological Society.

"Will the Russian peasant ever obtain the personal satisfactions and advantages under the factory system of a collectivized farming, living in rural apartment houses with common eating rooms, that the American farm family has on its own homestead?" Dr. Sanderson demanded. "If efficiency and industrial output are the criteria, the Russian or the industrial system may be vindicated, but if human values are primary, it is desirable to determine by strictly scientific methods what human values are obtained by the more traditional type of family life and to what extent it may abdicate its former functions without thereby destroying its essential values."

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BOTANY

Big Tree of Tule Re-examined; Claimed as World's Greatest

THE OLDEST living member of the plant or animal kingdom, and therefore the oldest living thing in the world, as far as is known, is a cypress tree in the Indian village of Santa María del Tule, a few miles east of the City of Oaxaca in Mexico. This is the opinion of Dr. Herman Von Schrenk, consulting timber engineer of St. Louis, Mo., who, during a recent visit to Oaxaca, made a second study of the giant tree. The first was made just thirty years ago by Dr. Schrenk.

Dr. Schrenk believes the age of the Tule tree not less than 4,000 years, and bases his estimate on a boring he has just taken, with the permission of the Mexican Ministry of Agriculture, out of another giant cypress in the railroad yards at Oaxaca City. The ring count of the boring showed the second tree about a thousand years old, and by comparing its size with that of the Tule tree, Dr. Schrenk was convinced that the latter was at least 4,000 years old. The boring showed the Mexican cypress, or ahuehuete, as the Indians call it, to be of extremely slow growth.

The Tule tree is about 140 feet high, and 24 men can span it with their arms, its circumference being about 117 feet at 40 inches off the ground. But the true circumference is hard to measure because of the great unevenness of the

trunk, which is far from being a true cylinder. This unevenness has caused many persons to believe that the tree is really three trunks grown together instead of one. But most botanists who have viewed it, admitting that this cypress can thus fuse its trunks and even branches, say that the Tule tree is really a single trunk, and that such unevenness is a characteristic of the species.

Like the Florida swamp cypress, the Tule tree loves water. The studies of Cosiano Canzatti, an Italian botanist long resident in Oaxaca, show that it is supplied by streams flowing underneath the roots. Geologists believe the valley in which the Tule tree stands was once a lake district, and that the water went almost to Mitla, ancient Zapotecan capital some 30 miles east of Oaxaca City. According to Indian history, too, lakes once filled the three-armed valley of Oaxaca, and these were drained a century before America was discovered, by Zapotecan engineers who widened a cut existing at the end of the southern branch of the valley.

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Cellophane cloth, made by fixing a layer of cellophane against a fabric backing, is a new shiny material for such things as book covers, shelf linings, costumes, and window displays.



OLDEST LIVING THING

is this cypress tree near Oaxaca, Mexico, which is probably not less than 4,000 years old.

EVOLUTION

Depression Spurs Evolution

Today's Economic Depression is Trivial Compared With Geologic Hard Times That Hit the Earth Often

By DR. FRANK THONE

DEPRESSION is a word of harsh and hideous sound to the ears of most of us just now. To those who "holler" loudest, it means at least temporary deprivation of accustomed luxuries. To those who have been saying least, it means the grim endurance of bitter want. But to all of us the idea that depressions have been the world's great spur to progress, that successive hard times have been a series of evolutionary sieves to sort the fit from the unfit, hardly comes at first as at all a cheering gospel. Each of us, nursing his own trouble and making it seem as big as possible, may be too apt to see himself as among the lost, the non-survivors.

But there is at least one philosophic scientist, Dr. Carey Croneis of the University of Chicago, who looks back over the earth's immensely long geologic history and sees in it the same moral that the more thoughtful historians and economists have been finding in the story of our own briefer, more rapid pulse of financial booms and slumps. Resolutely he tells us that through the millions of centuries, hard times have been good times, and good times really bad times in disguise. Geologic history has repeated itself over and over in an ever-ascending spiral: a cosmic depression has scourged the planet, eliminating inflated stocks, trimming the chastened survivors to the bone and sending them forth fitter, more alert, more able to take advantage of the returning better times. But the better times have betrayed those who trusted them too much, luring them into overdevelopment and too-optimistic expansion, so that when the next crash came—as come it always did—down they went in their turn and the cycle repeated itself.

"Even the continents have had their ups and downs," Dr. Croneis writes in the *Scientific Monthly*, "and of course their areas have changed remarkably throughout the past. They have presented bold, swashbuckling outlines when they stood high, but they have made sorry, attenuated showings during their

periods of depression. Old Mother Earth has indeed suffered many vicissitudes. Her facial expression is one of great mobility. Although the changes are ordinarily too slight to be noted by the casual observer, the geologist knows that during the long geologic past her face has been wrinkled where now it is smooth, and unmarked where now it is deeply furrowed. As amanuenses to the 'Old Lady' the geologists also know that she still entertains young ideas. She has surreptitiously lifted her face time and again. But the parable from the past is more clearly understood and more definitely encouraging when we remember that the earth has not only risen above her earlier depressions, but she has generally risen higher, rejuvenated and youthful after each succeeding deluge. . . .

Vital Panics

"The record of earlier depressions is, of course, only in part a physical story. Even more pertinent comparisons may be drawn with the panics which life itself has encountered and survived Anteus-like, with strength redoubled.

"If all geologic time is taken as 2,000,000,000 years and is represented on a clock dial as one hour, then 33 minutes of that hour elapse before the age of invertebrate animals is well under way. Even the beginning of the age of reptiles and the dominance of the dinosaurs occurs only nine minutes before the minute hand reaches twelve. More surprising still is the fact that mammals, the dominant life of the present, have been the ruling animals of only the last paltry two and a half minutes of the hour.

"And man, commonly thought to have been present for 1,000,000 to 2,000,000 years has only occupied the center of the stage a breathless two or three split seconds. In fact, man is such a newcomer that he has existed only while our geological clock has been striking the hour.

"But in spite of the fact that 'depressions' occurred long before the advent of life, it is the effect of 'hard times' upon the organisms which particularly

concerns man, the rankest of the untried *nouveau riche* among the animals, many of which for ages have lived in intimate association with man's relatively new acquaintance, Immortal Depression."

Through all of these ages of recurring depressions, the curve of life has pursued an upward spiral, as Dr. Croneis sees it. However, it is not the smooth optimistic unbroken rise pictured by well-fed philosophers of mid-Victorian days, when evolution as a popular idea was a new thing under the sun. Dr. Croneis admits setbacks as well as advances; the curve is ragged, though still always upward trending. In times of stress, he says, the weak organisms have died out, but the strong have always emerged from the troughs of trouble more powerful than ever. Modified to fit the changing environment, they have been ready to take advantage of the return of "good times."

When Dr. Croneis speaks of a "strong" organism, he does not at all mean bulky in muscle, but strong in the balance of a fit body and an alert mind. If the world's recurring geologic hard times have been consistently ruthless toward any one tendency, it has been toward the piling up of huge bulk without intelligence governing it. One need only mention the dinosaurs, out of a dozen possible examples. A *Diplodocus* stuffed with his own flesh was like a bank stuffed with unrealizable paper, or a huge over-capitalized corporation, while its poor teacupful of brains swings the figure, with inevitable irony, to golf-playing dummy directors. No wonder such monsters, with all their resources tied up in unwieldy "organization," could not change front to meet the crisis when it came, and so perished!

Science Cannot Answer

When or how life began on earth is a riddle which science is still unable to answer. The oldest rocks that contain fossils at all, known as the Cambrian, show that at that remote point in time (roughly half a billion years) animal life was already amazingly diversified. All the principal groups except the backboneed animals were represented, and even these showed some hints of beginnings. It would not be too rash to say, therefore, that the known fossil record accounts for only the last half

of life's long story on this planet; though admittedly it is this second half that is the most dramatic and exciting, and the nearer you come to the present the faster the action becomes.

In the lack of fossil records, then, we cannot say what catastrophic depressions preceded the Cambrian, the first stage we know anything about. From the tortured shapes of some of the earlier rocks, we can guess that they were numerous enough, and severe enough. For the present the rest remains shrouded in mist.

But from the Cambrian on, through all the Paleozoic, or Elder Age of Animals, the response of life to the challenge of calamity is writ large, time after time.

In the early seas, the aristocracy were the trilobites, creatures related to crabs and lobsters, resembling in general appearance their diminutive remote cousins the many-legged "pillbugs" you find under boards and in damp cellars.

"Incredible as it may seem," remarks Dr. Croneis, "they were the first families then; and in their time there was no living thing to dispute their prominence, at least in the matter of intelligence. Nevertheless, in their own life history they tell the old but ever recurrent story of the survival of the simple and the destruction of the specialized. The ornate members of the group (for even the intelligent have never completely resisted the urge of megalomania), like over-expanded individuals, families or industries, flourished in times of plenty, but they became extinct long before their lowly, generalized and conservative cousins had departed from the scene."

Fish Ruling the World

At last, however, times got too hard even for the fittest of the trilobites; or more likely a newer aristocracy, driven into more efficient living by the spur of tight times, eliminated them. At any rate, we see, several geological depressions later, the race of fishes ruling the world and facing another period of crisis, with their water supply dwindling and their pools becoming so stagnant that gill-breathing was becoming nearly impossible.

This was one of the Big Moments of the history of animal life. Dr. Croneis pictures it briefly: "A few ganoid types, with the true spirit of pioneers, used their fringed fins to crawl painfully from the desiccating ancestral pools to other less stagnant ones. These first



THE BEST PEOPLE

These were the best people about a dozen major depressions ago. It took all the hard knocks the world has had since then to evolve Homo sapiens of 1933. This restoration at the Buffalo Museum of Science depicts a coral reef community of Devonian time.

air-breathing, partially land-living vertebrates not only gave rise to the amphibians (relatives of frogs and salamanders)—they originated a Paleozoic parable to the effect that, then as now, animals or industries which, instead of bowing to hard times, use what resources they have to meet the changing situations are likely to be rewarded handsomely with the return of prosperity."

These fish that came ashore because they had to, and liked it, ruled the world when the land consisted largely of endless warm swamps rich with coal-forming vegetation and ahum with giant insects for the new rulers to eat. The Coal Age was a time like the still-lamented Late Twenties: an apparently boundless era of easy pickings, a "permanent plateau" at a bull market level. But like the same lush period in our own memories, the Coal Age crashed into a terrific period of cold and drought—and woe then to its fat, easy-going amphibian bosses!

This particular geologic depression ended not merely a chapter, but a whole volume. The Paleozoic was closed, and the Mesozoic, the Middle Ages of geologic history, came on.

When hard times hit the world of the amphibians, some of them, more enterprising than the rest, were stimulated into developing more active bodies, armored with scales, able to withstand the droughtier air and to scramble more ably for the living that was now harder to get. They were like the energetic tribal chieftains of the ancient world at the breakup of the Roman Empire, who founded the first

feudal aristocracies. Their descendants, bigger and more heavily armored, became the real barons of the geological middle ages, the dinosaurs. Thus an entirely new ruling group arose out of the depression, and when prosperity came again they were its masters.

But they learned nothing from the experiences of their ruined predecessors. "The Mesozoic reptiles were megalomaniacs of the most confirmed sort," says Dr. Croneis. "They were the masters of all the important habitats. The dinosaurs ruled the land, marine reptiles invaded and conquered the sea, and the 'flying dragons' or pterodactyls were lords of the air.

"But scurrying underfoot of the giant dinosaurs were a few mouse-like primitive mammals. They were subservient indeed to the gigantic masters of the moment, who, as is characteristic of the great (and especially the near-great), probably were totally unaware of the mammals' presence. But these small creatures, like some apparently insignificant individuals and many unpromising infant industries, had great potentialities. They proved their mettle at the close of the Mesozoic, when the earth went through one of her really great depressions.

"This was, indeed, a time of revolution and of the 'reddest' sort, for the reptiles, like Russian royalists, were nearly blotted out, and they have never again been particularly dominant. But the small mammals weathered the hard times successfully. Out of their crude beginnings have come the greatly diversified and ruling mammalian types of today.

(Turn to Page 30)

PHYSICS

Oreston Suggested as Name For New Positive Electron

A NAME is wanted for the newest particle discovered by science, the positive electron. "Positron" has been suggested and is widely accepted. But many scientists object to it, on the grounds that it lacks proper character. Prof. Niels Bohr in his talks to the California Institute of Technology, where the positive electron was discovered, pointed out the desirability of a new name and mentioned "anti-electron" as a possibility but did not urge it. He said it had the advantage that it suggested the fact that the positive electron is, in a sense, merely the absence of the negative electron.

The most brilliant suggestion, however, has come from Prof. Herbert Dingle, visiting here in Pasadena from the Imperial College of Science and Technology in South Kensington. He recalled the fact that Electra had a brother Orestes and surely the positive and negative electrons are like brother and sister. He therefore suggested the name "Oreston" for the positive electron.

The appropriateness of this suggestion becomes especially apparent when one realizes that the oreston as observed in physics, does not have a long life but very soon combines with an ordinary electron. The two annihilate each other. As they disappear, their energy is given out in the form of light quanta.

Science News Letter, July 8, 1933

ENDOCRINOLOGY

Brain Gland Secretion Found Cause of "Pop-Eye" Goiter

A NEW HORMONE of the pituitary gland that exercises control over the thyroid and seems to "double" for the secretion of that gland producing exophthalmic goiter was a leading topic of discussion among medical scientists at the meeting of the Federation of American Societies for Experimental Biology.

As one doctor expressed it: "The pituitary gland is in the driver's seat."

It is small but important, located at the base of the brain. It produces many powerful hormones or chemical regulators of the body's activities. Some of these hormones have an important stimulating effect on the sex glands. Another hormone promotes growth.

The latest discovery is a new hor-

mone that influences the secretion of thyroid gland. Exophthalmic goiter, characterized by extreme nervousness and protruding eyes, results from over-secretion of the thyroid gland. Now scientists have found the newly discovered pituitary hormone can produce the same effect.

For the first time scientists have been able to produce this type of goiter in animals, which will greatly aid further research on this serious and widespread disease for which the only relief at present is surgical operation.

Daring French scientists have reported that they produced exophthalmic goiter in human beings by doses of the latest pituitary hormone.

The first announcements of the new hormone received little recognition even from scientists.

But now the full significance of the new hormone is apparent and in many research centers studies are being made upon it.

Whether or not future treatment of exophthalmic goiter will be directed toward the pituitary instead of the thyroid gland cannot be determined from these early investigations.

Science News Letter, July 8, 1933

BACTERIOLOGY

Greased Bacteria Pay Toll To Get Through Filters

BACTERIA slipping through the pores of fine-grained porcelain filters, with their way "greased" by the pure protein "K medium" developed by Prof. Arthur I. Kendall of Northwestern University Medical School, must pay toll before they can pass. This has been discovered by O. F. Edwards of Michigan State College, who reported on his experiments to the American Association for the Advancement of Science.

Mr. Edwards found that none of the bacteria in the first twenty milliliters (somewhat less than an ounce) of the culture fluid got through the filters, but after that their living cells appeared on the other side. The explanation he suggested was that the bacteria were caught and held on the inner surfaces of the fine pores in porcelain. After a certain number were thus captured, the porcelain surface could hold no more, and the later comers passed on scot-free.

Mr. Edwards presented his paper before the Phi Sigma Society.

Science News Letter, July 8, 1933

IN SCIENCE

BOTANY

Plant Breeder Creates New Tomato Species

E VOLUTION finds fresh supporting evidence in a tomato species that has been artificially produced by Prof. E. W. Lindstrom of Iowa State College, Ames. Prof. Lindstrom started with a tomato variety whose cells contained only half the normal number of chromosomes, the material bearers of heredity. By inbreeding it, he produced another variety with the full normal number, and by inbreeding again he secured a line of plants with a double number of chromosomes.

This latter group of plants is different in leaves and fruit from other tomatoes, and it refuses to be cross-bred with them. Fundamentalists doubters have often challenged scientists to produce a new species of plants. Since distinctive appearance and refusal to cross-breed are taken as marks of separate species, Prof. Lindstrom holds that he has squarely met the challenge.

Science News Letter, July 8, 1933

HEREDITY

Heredity Carriers are Probably Large Molecules

GENES, the hypothetical specks of protoplasm that bear hereditary characters from one generation to the next, are probably single molecules, or atom-groups, of about the size of large protein molecules, Herbert S. Wallace of the University of Denver told the American Association for the Advancement of Science.

Genes act like organic molecules in many ways, Mr. Wallace said. They resist change and when they do change they do so suddenly. They respond to X-ray and other physical and chemical factors very much as organic molecules do. And their measured distances apart on the chromosomes, something on the order of one five-millionth of an inch, is approximately the known size of certain large protein molecules.

Science News Letter, July 8, 1933

THE FIELDS

METEOROLOGY

Long-Range Forecast Efforts Make Use of Sunspots

EXPERIMENTS in the long range forecasting of weather at the Scripps Institution of Oceanography, La Jolla, Calif., may possibly be extended to take in factors such as sunspots and solar radiation, in addition to the data on oceanic and atmospheric phenomena. This was indicated by Dr. George F. McEwen, professor of physical and dynamical oceanography at the Institution, who spoke in Vancouver, B. C., before the meeting of the Fifth Pacific Science Congress.

"We are ready to make any use," Dr. McEwen stated, "of the extensive work on solar radiation and sunspots that we find to be of help. The cyclical nature of the action of the planets on the sun in producing sunspots and the possible direct electrical action of the sun in producing vortices in the earth's atmosphere afford a field that should be thoroughly investigated. Finally, the long period ocean tides depending upon changes in planetary configurations may have some forecast value, and are being investigated by others."

Science News Letter, July 8, 1933

CHEMISTRY

Dangerous Gas Found In Pittsburgh Air

SULFUR DIOXIDE in concentrations as high as 2.5 parts per million of air was found in tests of the atmosphere of Pittsburgh by C. E. Betz and J. H. Holden of the Pittsburgh Testing Laboratory and J. O. Handy of New York City, their report to the American Chemical Society, shows.

This maximum amount of the gas was found in the morning about 9 o'clock, the maximum for the afternoon being 1.6 parts per million.

Sulfur dioxide has been found by scientists of the National Bureau of Standards to be seriously harmful to property, and it may also have a bad effect on health.

Concentrations as low as 2 parts per million, less than that found in the morning air of Pittsburgh, were found by the Bureau of Standards workers to have a marked injurious effect on books, leather, paper and similar materials within ten days time. The new archives building in Washington, now being erected to house the documents of the Government, is being provided with means for washing the air with an alkaline wash to remove this injurious material.

The section in Pittsburgh where the tests were conducted is believed to be typical of industrial communities, for it contains within the radius of a city block two large garages, a large dairy products plant, a school, a hospital, and a small manufacturing plant. It is in a thickly populated section, approximately one-half mile from the business district.

Sulfur dioxide is formed in the burning of coal, and the highest amounts were found on mornings when there was a heavy blanket of fog and smoke with little or no wind velocity.

Science News Letter, July 8, 1933

ZOOLOGY

Collectors' Paradise Found On "Haunted" Peak

ASCENT of a "haunted" mountain in Siam, greatly feared by superstitious Siamese natives, is reported by Dr. Hugh M. Smith, who has just sent extensive zoological collections to the Smithsonian Institution.

Dr. Smith, who is fisheries adviser to the Siamese Government and collaborator of the Smithsonian Institution, ascended the mountain and found on the top a collector's paradise.

On the flat, grassy summit were pine and chestnut trees garlanded with hanging orchids and with gibbons swinging among the branches. The "spirits" of this cloud-land forest were chattering monkeys, barking deer, rare giant squirrels, porcupines, and bamboo rats. Black bears made their nests in chestnut trees and ate the nuts. Flocks of imperial pigeons and other rare birds were there.

From this and other expeditions in Siam, Dr. Smith collected insects, birds, reptiles, and mammals which he has shipped to the Smithsonian. It is believed that some of the Siamese species will prove to be new to science.

Science News Letter, July 8, 1933

ENGINEERING

Thirsty Bricks Prevent Leaky Walls

TO AVOID leaky walls, use absorbent, "soaky" brick and make the mortar joints thin. These recommendations were made by Prof. W. C. Voss of the Massachusetts Institute of Technology, who spoke before the meeting of the American Society for Testing Materials.

The brick should be able to absorb from 5 to 10 per cent. of its weight in water in two days; and most of this absorption should take place in the first ten minutes of soaking. The bricks' ability to "drink water" insures good bonding with the mortar, making the wall into practically one solid piece. There should be some lime in the mortar to insure this action, Prof. Voss recommended.

Brick structures are commonly thought of as being stiff and unyielding, and likely to crack suddenly under heavy loads. Yet brick masonry beams built and tested under the supervision of Prof. M. O. Whitney of the University of Wisconsin showed astonishing degrees of flexibility. The bricks were laid in a mortar containing a high proportion of Portland cement, on various types of steel framework which served as reinforcement after the masonry beams had solidified.

Science News Letter, July 8, 1933

PHYSIOLOGY

Auto Gas May Harm Unborn Children

CARBON monoxide, deadly gas of closed garages, may take toll of unborn young, studies reported at Chicago before the Phi Sigma Biological Research Society by Lloyd L. Wells and W. E. Batchelder of the University of New Hampshire indicate.

Messrs. Wells and Batchelder, with their associates, gave repeated doses of an atmosphere containing one and one-half per cent. of carbon monoxide to female rats about to produce litters of young. Some of the litters were born prematurely, others were absorbed back into the mother's body and not born at all. Many of the young rats that were born alive were not normal.

It was found that a rat could build up a resistance to carbon monoxide, but this resistance was only temporary.

Science News Letter, July 8, 1933

PHYSICS

Galileo on Falling Bodies

"A Classic of Science"

The Famous Tower of Pisa Experiment is Discussed by Galileo's Three Delightful Fictitious Philosophers

DIALOGUES CONCERNING TWO NEW SCIENCES by Galileo Galilei, translated from the Italian and Latin into English by Henry Crew and Alfonso de Salvio of Northwestern University, with an Introduction by Antonio Favaro of the University of Padua. New York: The Macmillan Company: 1914. This is an exact reprint of an extract from this translation of Galileo's 1638 edition, by permission of The Macmillan Company, publishers.

SAGREDO. I quite agree with the peripatetic philosophers in denying the penetrability of matter. As to the vacua I should like to hear a thorough discussion of Aristotle's demonstration in which he opposes them, and what you, Salviati, have to say in reply. I beg of you, Simplicio, that you give us the precise proof of the Philosopher and that you, Salviati, give us the reply.

SIMPLICIO. So far as I remember, Aristotle inveighs against the ancient view that a vacuum is a necessary prerequisite for motion and that the latter could not occur without the former. In opposition to this view Aristotle shows that it is precisely the phenomenon of motion, as we shall see, which renders untenable the idea of a vacuum. His method is to divide the argument into two parts. He first supposes bodies of different weights to move in the same medium; then supposes, one and the same body to move in different media. In the first case, he supposes bodies of different weight to move in one and the same medium with different speeds which stand to one another in the same ratio as the weights; so that, for example, a body which is ten times as heavy as another will move ten times as rapidly as the other. In the second case he assumes that the speeds of one and the same body moving in different media are in inverse ratio to the densities of these media; thus, for instance, if the density of water were ten times that of air, the speed in air would be ten times

greater than in water. From this second supposition, he shows that, since the tenuity of a vacuum differs infinitely from that of any medium filled with matter however rare, any body which moves in a plenum through a certain space in a certain time ought to move through a vacuum instantaneously; but instantaneous motion is an impossibility; it is therefore impossible that a vacuum should be produced by motion.

SALVIATI. The argument is, as you see, *ad hominem*, that is, it is directed against those who thought the vacuum a prerequisite for motion. Now if I admit the argument to be conclusive and concede also that motion cannot take place in a vacuum, the assumption of a vacuum considered absolutely and not with reference to motion, is not thereby invalidated. But to tell you what the ancients might possibly have replied and in order to better understand just how conclusive Aristotle's demonstration is, we may, in my opinion, deny both of his assumptions. And as to the first, I greatly doubt that Aristotle ever tested by experiment whether it be true that two stones, one weighing ten times as much as the other, if allowed to fall, at the same instant, from a height of, say, 100 cubits, would so differ in speed that when the heavier had reached the ground, the other would not have fallen more than 10 cubits.

SIMP. His language would seem to indicate that he had tried the experiment, because he says: *We see the heavier*; now the word *see* shows that he had made the experiment.

SAGR. But I, Simplicio, who have made the test can assure you that a cannon ball weighing one or two hundred pounds, or even more, will not reach the ground by as much as a span ahead of a musket ball weighing only half a pound, provided both are dropped from a height of 200 cubits.

SALV. But, even without further experiment, it is possible to prove clearly, by means of a short and conclusive argument, that a heavier body does not

move more rapidly than a lighter one provided both bodies are of the same material and in short such as those mentioned by Aristotle. But tell me, Simplicio, whether you admit that each falling body acquires a definite speed fixed by nature, a velocity which cannot be increased or diminished except by the use of force or resistance.

SIMP. There can be no doubt but that one and the same body moving in a single medium has a fixed velocity which is determined by nature and which cannot be increased except by the addition of momentum or diminished except by some resistance which retards it.

SALV. If then we take two bodies whose natural speeds are different, it is clear that on uniting the two, the more rapid one will be partly retarded by the slower, and the slower will be somewhat hastened by the swifter. Do you not agree with me in this opinion?

SIMP. You are unquestionably right.

SALV. But if this is true, and if a large stone moves with a speed of, say, eight while a smaller moves with a speed of four, then when they are united, the system will move with a speed less than eight; but the two stones when tied together make a stone larger than that which before moved with a speed of eight. Hence the heavier body moves with less speed than the lighter; an effect which is contrary to your supposition. Thus you see how, from your assumption that the heavier body moves more rapidly than the lighter one, I infer that the heavier body moves more slowly.

SIMP. I am all at sea because it appears to me that the smaller stone when added to the larger increases its weight and by adding weight I do not see how it can fail to increase its speed or, at least, not to diminish it.

SALV. Here again you are in error, Simplicio, because it is not true that the smaller stone adds weight to the larger.

SIMP. This is, indeed, quite beyond my comprehension.

SALV. It will not be beyond you when I have once shown you the mistake under which you are laboring. Note that it is necessary to distinguish

between heavy bodies in motion and the same bodies at rest. A large stone placed in a balance not only acquires additional weight by having another stone placed upon it, but even by the addition of a handful of hemp its weight is augmented six to ten ounces according to the quantity of hemp. But if you tie the hemp to the stone and allow them to fall freely from some height, do you believe that the hemp will press down upon the stone and thus accelerate its motion or do you think the motion will be retarded by a partial upward pressure? One always feels the pressure upon his shoulders when he prevents the motion of a load resting upon him; but if one descends just as rapidly as the load would fall how can it gravitate or press upon him? Do you not see that this would be the same as trying to strike a man with a lance when he is running away from you with a speed which is equal to, or even greater, than that with which you are following him? You must therefore conclude that, during free and natural fall, the small stone does not press upon the larger and consequently does not increase its weight as it does when at rest.

SIMP. But what if we should place the larger stone upon the smaller?

SALV. Its weight would be increased if the larger stone moved more rapidly; but we have already concluded that when the small stone moves more slowly it retards to some extent the speed of the larger, so that the combination of the two, which is a heavier body than the larger of the two stones, would move less rapidly, a conclusion which is contrary to your hypothesis. We infer therefore that large and small bodies move with the same speed provided they are of the same specific gravity.

SIMP. Your discussion is really admirable; yet I do not find it easy to believe that a bird-shot falls as swiftly as a cannon ball.

SALV. Why not say a grain of sand as rapidly as a grindstone? But, Simplicio, I trust you will not follow the example of many others who divert the discussion from its main intent and fasten upon some statement of mine which lacks a hair's-breadth of the truth and, under this hair, hide the fault of another which is as big as a ship's cable. Aristotle says that "an iron ball of one hundred pounds falling from a height of one hundred cubits reaches the ground before a one-pound ball has fallen a single cubit." I say that they

arrive at the same time. You find, on making the experiment, that the larger outstrips the smaller by two finger-breadths, that is, when the larger has reached the ground, the other is short of it by two finger-breadths; now you would not hide behind these two fingers the ninety-nine cubits of Aristotle, nor would you mention my small error and at the same time pass over in silence his very large one. Aristotle declares that bodies of different weights, in the same medium, travel (in so far as their motion depends upon gravity) with speeds which are proportional to their weights; this he illustrates by use of bodies in which it is possible to perceive the pure and unadulterated effect of gravity, eliminating other considerations, for example, figure as being of small importance, influences which are greatly dependent upon the medium which modifies the single effect of gravity alone. Thus we observe that gold, the densest of all substances, when beaten out into a very thin leaf, goes floating through the air; the same thing happens with stone when ground into a very fine powder. But if you wish to maintain the general proposition you will have to show that the same ratio of speeds is preserved in the case of all heavy bodies, and that a stone of twenty pounds moves ten times as rapidly as one of two; but I claim that this is false and that, if they fall from a height of fifty or a hundred cubits, they will reach the earth at the same moment.

SIMP. Perhaps the result would be different if the fall took place not from



GALILEO'S PHYSICS LABORATORY

The famous Leaning Tower of Pisa, from whose top Galileo dropped various weights to disprove Aristotle's axiom, while he was a professor in the nearby university.

a few cubits but from some thousands of cubits.

SALV. If this were what Aristotle meant you would burden him with another error which would amount to a falsehood; because, since there is no such sheer height available on earth, it is clear that Aristotle could not have made the experiment; yet he wishes to give us the impression of his having performed it when he speaks of such an effect as one which we see.

Science News Letter, July 8, 1933

ASTRONOMY

Mars Favorable to Life, American Astronomer States

RECENT observations confirm that conditions on Mars favor the existence of life on that planet, stated Dr. V. M. Slipher, distinguished astronomer, to Science Service's London correspondent.

Dr. Slipher, director of the Lowell Observatory, Ariz., where researches on planets have been carried out for the last four decades, was recently honored by the British Royal Astronomical Society, and lectured before the Royal Institution of London, upon the earth's nearest neighbors.

"If a rocket ship or other form of interplanetary locomotion existed today," said Dr. Slipher, "I should certainly not discourage any one from attempting to reach Mars." With its polar snow-caps, seasonal darkenings almost certainly due to vegetation, atmosphere containing water and oxygen and clouds, with an average temperature of 48 degrees Fahrenheit, conditions for life as we know it are most promising on Mars.

The regular markings on Mars, presumed by some to be canals constructed

by intelligent beings, have been confirmed by independent astronomers, including Schaeber, Campbell, Hussey and recently Trumpler at the Lick Observatory.

Photographs of the planets in different lights, by the use of colored screens, have given valuable additional information concerning the nature of their surface markings, and more will be gained by new methods and patient observation than by increased size in telescopes, Dr. Slipher contends.

As an instance he cites the proof of the presence of water and oxygen in the atmosphere of Mars, given by the "absorption spectrum" of Mars as compared with that of the moon, when in the same position in the sky, and the confirmation of the average temperature of 48 degrees Fahrenheit by radiometric measurements carried out at Flagstaff, Ariz.

The reason why astronomers have sometimes differed as to the existence of certain markings upon the surface of Mars, is easily understood if we admit the presence of clouds and other atmospheric disturbances which may considerably affect the appearance of the planet within a relatively short time. Dr. Slipher produced many photographs showing clearly the variation in the appearance of the Martian disc at different times.

Science News Letter, July 8, 1933

Electric welding has practically done away with riveting in German naval shipyards.

It is believed that ancient traditions of certain fine swords being sent from heaven can be explained by the fact that they were made from meteoric iron.



CHEMISTRY IN DAILY LIFE

an address by

Dr. C. M. A. Stine

Vice President, E. I. du
Pont de Nemours &
Company

To be given Friday, July
14, at 1:45 p. m. Eastern
Standard Time over stations
of the Columbia Broadcast-
ing system. Each week a
prominent scientist speaks
over the Columbia System
under the auspices of
Science Service.

PSYCHOLOGY

Punishment Isolates Children From Parent Who Disciplines

Students Tell of Resentment After Youthful Whippings Others Report Respect for Lenient Elders

WHEN FATHER takes you to the woodshed or mother gets out her slipper, you may be sorry and resolve to do better or you may become sullen and defiant—but in any event you become mentally isolated from the authority that brings down punishment on your head.

Inquiry into the effects of punishment in 200 families showed that one result always follows, and that is a certain degree of isolation of the punished from the punisher, Dr. Ellsworth Faris, of the University of Chicago told scientists attending the Conference on Research in Child Development, held under the auspices of the National Research Council.

Punishment of children, and adults as well, is an accompaniment of the development of civilization—paradoxical though that may sound.

"Punishment did not always exist in human society," Dr. Faris said. "The origin of punishment was relatively late in racial experience being, perhaps, contemporaneous with civilization. The practice of punishing children arose long after the punishment of adults came into society. The effect of punishment on children has a disruptive tendency on the group to which children belong. The resulting isolation results in an increase of the 'social distance' which tends to lessen the control of the adults over the attitudes of the children in the group."

Dr. Faris quoted from the statements of college students who had been punished severely in their youth and those who had not.

One un-punished student wrote: "Discipline excellent . . . obeyed every rule . . . I worshipped my father," and another, "Never whipped . . . seldom scolded . . . I just seemed to know what mother and dad wanted me to do or not do."

In contrast are the following from those who were punished:

"Father whipped so hard I prayed I might die. There was bitter hatred for

my father. I rebelled and practiced deceptions and did not regret it. I would remain sullen and not talk for days. He never allowed us to explain."

"Step-father would take the buggy whip to me . . . when I was thirteen I ran away."

"Punishment . . . whipping by mother. Severe scolding by father which hurt worse and lasted longer . . . rebelled against the punishments and practiced deceptions to keep from getting caught. Never lied except on a few occasions."

"Discipline by mother scolding and whipping . . . evaded punishment till father came home . . . he never spanked . . . scolding made me resentful and sulky . . . father talked until we were ashamed. Father expected obedience and got it . . . no fear of him . . . respected and adored him . . . never resented father, rebelled against mother . . . deceitful to mother to evade punishment . . . never with father."

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ARCHAEOLOGY

400,000-Year-Old Tools Found in Sand Beds

BONE TOOLS made by primitive dwellers in the Rhine valley 400,000 years ago, before even the low-browed Neanderthals lived there, have been discovered and described by Dr. Otto Schmidtgen, director of the Mainz Museum of Natural History.

When they were first found, even their discoverer was skeptical of them, because it has always been held that the first bone implements were made by the much later men of the Crô-Magnon type, who lived in the Aurignacian period. However, so many of them have now been unearthed in the sand beds at Mosbach near Mainz that there seems to be no further doubt of their antiquity.

The materials used were bones of horses and elephants, and they were shaped into borers, scrapers and points.

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PALEONTOLOGY

200,000,000-Year-Old Track Tells Tale of Insect Tragedy

FOOTPRINTS in the sands of time that have since hardened into solid rock near the German city of Nierstein on the Rhine tell the tale of a little tragedy that happened something over two hundred million years ago. The small tracks of an insect can be traced across a slab of sandstone that was once desert sand. The tracks of a lizard converge upon them. Presently the two trails come together—and beyond that there are no more insect tracks.

This small tale of sudden death on the sands is only one of many written in natural hieroglyphics preserved in the Permian sandstones around Nierstein, that have been studied by Prof. Otto Schmidtgen, director of the Mainz Museum of Natural History, and his collaborators. They have been able to spell out a considerable amount of information about life as it was lived in that part of the world long before there was a Rhine.

The Nierstein formations date from that great depression period in earth's geologic history known as the Permian, when drought and apparently cold prevailed over much of the planet. During the same period the desert sands in southwestern America, where now the Grand Canyon of Arizona cuts its mile-deep gash, also recorded the footprints of scurrying animals, which are now part of the petrified record.

Prof. Schmidtgen and his associates have been able to build up some kind of a picture of the life of those remote times by repeating the events now, so far as they are able. They take insects, reptiles and amphibians, and let them walk and run over sands and muds of various degrees of hardness and wetness. They have found that the same animal may make several quite different-looking tracks, according to the kind of ground it is going over and the speed at which it travels.

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ETHNOLOGY

American Negroes Came From Small Part of Vast Africa

ONE SUPPOSEDLY unsolvable mystery—from what parts of Africa came the negroes of America—is being cleared up. How it is being done was reported by Dr. Melville Herskovits of Northwestern University, to the American Association for the Advancement of Science.

The regions of Africa where slave traders captured natives were not nearly so vast and vague as popular fancy has believed, Dr. Herskovits demonstrated.

That some slaves came from the deep interior of the Dark Continent or from East and South Africa is not to be denied, he said. But by far the major portion of the slaves were drawn from a region that comprises only a fraction of the vast bulk of Africa. This area was the West Coast from Loango to Gambia and the forested belt that stretches a hundred or so miles inland.

Several kinds of evidence are being focussed on the problem, Dr. Herskovits showed. One is the testimony of those who wrote at the time when slaving operations were at their height. In the great mass of literature from this period, African names and places were so poorly recorded that they have been considered of little historical value. But the information can be very useful when fitted together with information from other sources, the ethnologist has found.

The other sources are negroes in Africa and negroes in America. Old men who actually participated in the slave trade are living in Africa today. From several of these, Dr. Herskovits obtained details of the trade and the routes taken. The ethnologist is also studying Africanisms that have survived in negro life in America.

In South America and islands of the

Caribbean, he finds the customs and lore of African regions occurring over and over. Various names of gods, place names, ideas of religion can be identified as coming from the Gold Coast, Dahomey, Togoland, Nigeria, and other definite parts of the West Coast. In the United States most negro memories of Africa are identified as generalized West Coast Africanisms.

Describing some of these, the ethnologist said:

"Negroes in the United States are Christians. Yet their dead must 'cross the river Jordan' in a manner that is exactly parallel to that in which the West African dead must cross their rivers before they reach the spirit world. We find the African importance of wakes for the dead. And we observe an entire complex of ritual surrounding burial so akin to the West African funeral customs, even to 'burying shallow' until arrangements can be made for a proper funeral, the passing of small children over the coffin as they do in the Suriname bush, and the inclusion of food and money in the coffins."

Declaring that peculiarities of speech of southern negroes have been mistakenly accounted for, Dr. Herskovits said:

"Any grammar of a West African people explains the grammatical oddities which it has become customary to ascribe to the influence of Elizabethan English on the early slaves, or to the grammatical perversions of child-like folk taught the language of the masters in a manner that children are spoken to."

Science News Letter, July 8, 1933

ASTRONOMY

New York to Have Third Planetarium

WITH a Reconstruction Finance Corporation loan of \$650,000, the American Museum of Natural History will soon begin construction of a planetarium in New York City which will show the motions of stars and planets.

This will be America's third planetarium. The first has been in operation at Chicago for several years. The second will open this fall at the Franklin Institute Museum in Philadelphia. About a dozen planetaria are located in European cities. All have their intricate optical parts manufactured by the famous German firm of Zeiss.

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BOTANY

The Nymphs' Flower

See Front Cover

SERENE, cool, immaculate, the water lily floats beneath the summer sun, where the big flat drops of water shine like silver coins on the round, flat leaves. The water lily has been the delight of poets of all ages and peoples. Of moralists, too, who like to reflect that all that superb beauty has been extracted from the black mud of the bottom, where the rootstocks of the plant have their hold.

There are only a few kinds of water lilies in America. The white one is the most familiar, as well as the most beautiful. And it has the advantage over the European white water lily in that

it is very fragrant. Then we have a smaller yellow species, vulgarly called "cow lily" or "spatterdock" in the eastern states; but in the Rocky Mountains, where the white one does not grow, a second yellow species reaches a much larger size.

The tropics are the real home of the water lilies; here they develop all sizes and colors, including delicate pinks, glowing reds, and gorgeous blues. The great Brazilian species, *Victoria regia*, has inconspicuous flowers, but leaves so large that they will bear a grown man's weight.

Botanical names sometimes sound harsh to the layman, but there can be no quarrel with the Latin names of the water lily. There is some disagreement among botanists as to its proper name. One group calls it *Castalia*, which is the name of a fountain where the Muses of Greek mythology used to come. Other botanists, following the lead of the great Linnaeus, name it *Nymphaea*, which needs no explanation.

Science News Letter, July 8, 1933

PHYSICS

Protons Seen as Source Of New Atomic Particles

THAT THE NEWLY discovered particles, neutron and positron, supposed to be fundamental bricks from which all matter is built, are formed from the break up of protons, positively charged atomic hearts, is the view put forward by M. N. Thon, of the Institute of Chemistry of Paris, in a communication to *Nature*. The small number of neutrons and positrons met

with in the Universe is easily explained by the fact that a large amount of energy is needed to break up the protons.

M. Thon looks upon the neutron as an elementary material corpuscle without electric charges. The usual view taken considers the neutron as an aggregate of opposite electrical charges formed of a proton and an electron.

But, if that were so, points out M. Thon, the hydrogen atoms which consist of just such a combination of a proton and an electron should have the tendency to be transformed spontaneously into neutrons, which so far as we know is not the case.

Both the neutron and the positron have been discovered during the last year or so, the former in England, and the latter in America, by Dr. C. D. Anderson of California.

Dr. Anderson in March also made the suggestion that the proton, previously considered an elementary particle, may be a complex combination of a neutron and a positron

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They were one group which was not over-expanded at the time when opportune depression hit them. In effect, they sold the market short and made their fortunes in the steady decline of reptilian values. The roots of that great modern spreading tree of mammalian types were firmly anchored in the very depression which was too drastic for the optimistic dinosaurs who, to the final crash, continued bullish on 'Brawn not Brains, Inc.'

So far Dr. Croneis. He does not tell the final tale, or point the final moral, perhaps as being too obvious. But for the sake of completeness, the story of man himself might be added.

For man also was born of a depression, one of the greatest of depressions of more recent geologic time, the Pleistocene Ice Age. Human beings may have existed on the earth before the glaciers came, burdening the land over half Europe and North America and chilling the rest far down toward the tropics, but if they did we have no very conclusive evidence of it. Such pre-glacial men, if they existed at all, lived in days of ease and didn't have to hustle for a living. So, in all likelihood, they would have been contented to remain very much like their zoological cousins, the apes, clever and entertaining up to a certain point, but dull beyond that, and quite irresponsible and improvident.

The glaciers changed all that. By the time the Ice Age was half over we have plenty of evidence that man was on the job, looking out for Number One and Family in first-class order. He had learned to keep warm in spite of the glaciers, by taking to caves or

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building wickiups on the riverbanks where he fished, and by wearing clothing made of animal skins. He had invented improved tools and weapons of stone, which no ape ever did or thought of. He had made the most important discovery of all human history, lowbrow though he was: he had learned the use of fire.

All honor to Homo Neanderthalensis! He was no beauty to look at—decidedly not as handsome as his artist cousin of Crô-Magnon who came along later and supplanted him. He had a queer-shaped head, with a queer-shaped brain inside. But such talents as he had, he used in a tough spot, and he had the gumption to found the fortunes of the whole human race, right in the middle of the world's worst depression!

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ARCHAEOLOGY

24-Foot Weeping Idol Unearthed in Andes

A WEEPING stone giant 24 feet tall has been discovered at prehistoric ruins in the highlands of the South American Andes. Three big stone tears are carved on the giant's cheeks. Discovery of the enormous statue, pronounced unique in size, is reported by Wendell C. Bennett, anthropologist of the American Museum of Natural History.

While he was digging at the famous ruins of Tiahuanaco, near Lake Titicaca, Mr. Bennett struck stone, and uncovered the statue lying flat on its back. Prehistoric Indians who carved the idol gave it a head band with plumes, cloth trousers in a polka dot design, and a wide, decorated belt. The hands are held before the chest and the left hand holds a cup.

When the great figure stood erect and looked tearfully down on the little humans who made it, it was in the center of a small temple.

Mr. Bennett estimates that the stone weighs 18 tons. Indians of this part of South America had extraordinary skill and ant-like tenacity which enabled them to handle enormous stones and to make them into gates, statues, and monumental walls.

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A diamond needle sharpened to one-tenth of one-thousandth of an inch is used by engineers at the University of Michigan to test the smoothness of polished steel.

GENERAL SCIENCE

Economy Axe Falls Heavy On U. S. Bureau of Standards

THE "ECONOMY" axe has fallen hard on the scientific research work of the Government which has been conducted at the National Bureau of Standards. A loss of 380 persons, separated or furloughed for an indefinite period, from a total staff of only 974 is made necessary by new reductions in funds. This means a personnel cut of 39 per cent.

Drastic reductions in important and profitable research programs will be necessitated by this slash in personnel. The complete elimination of other projects appears to be inevitable.

Industry in the United States will be affected by the loss of 80 of the Bureau's personnel in the divisions working on commercial standards, including the divisions of building and housing, simplified practice, and trade standards. Another large group of 35 goes from the division which has been

doing aeronautic research under funds transferred from the aeronautics branch of the Department of Commerce.

Two of the research projects which will have to be completely abandoned are the study of photographic emulsions and the production of levulose sugar from artichokes.

Officials of the Bureau hope that it may be possible to obtain, from the appropriation for public works projects, funds to take care of the tests of materials that the Bureau will be expected to make in connection with the enormous public works program now being begun. In this case it may be possible to restore some of the furloughed employees.

Otherwise the Bureau of Standards will be faced with greatly increased volume of routine work to be handled by only 60 per cent. of their present personnel.

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CHEMISTRY

Heavy-Weight Hydrogen Great Scoop for America

"A GREAT scoop for America." The discovery of the heavy-weight hydrogen isotope, twin to the ordinary light kind of this basic element, was characterized in these words by Dr. F. W. Aston, British Nobel prize chemist and one of the leading foreign guests of the Century of Progress meeting of the American Association for the Advancement of Science.

Intensive studies of heavy water made from the double-weight hydrogen are being made in five or six American laboratories. Dr. Aston is meeting chemists and physicists engaged in these researches and discussing results.

Since Dr. Aston was the discoverer of the first isotope of a non-radioactive element, his praise of the discovery and exploration of the heavy isotope of hydrogen is authoritative. In a Science Service interview he also expressed admiration for the production of water

nine-hundredths heavier than ordinary water, which has been achieved at the University of California.

In 66 non-radioactive chemical elements which Dr. Aston, his collaborators at Cambridge and others have investigated, 191 isotopes have been found. This means that where scientists fifteen years ago thought one element "grew" nearly three are now known.

It is still proper to say there are 92 elements, or 93 if it is desired to consider the neutron as an element. But science now knows that there are varieties of each element, called isotopes. In the radioactive elements there are many more isotopes not included in this count.

The discovery of the mass two isotope of hydrogen by a group of scientists of Columbia University and the U. S. Bureau of Standards, praised by Dr. Aston, is the latest and most spectacular isotope discovery.

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• First Glances at New Books

Archaeology

THE OLD STONE AGE—M. C. Burkitt—*Macmillan*, 254 p., \$2.50. Written for students of pre-history and other readers who would like to understand the methods and the scientific principles of the pre-historian. There are not many books teaching fundamentals of archaeology. Prof. Burkitt's book does teach, and very clearly.

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Woodworking

THE BOY BUILDER—Edwin T. Hamilton—*Harcourt*, 290 p., \$2. All sorts of interesting things can be made in workshops and camps by following the directions contained in this book.

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Sociology

TIME TO LIVE—Gove Hambidge—*Whittlesey House*, 144 p., \$1.50. Philosophical and practical considerations of the use of leisure.

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Mathematics

PLANE TRIGONOMETRY—W. L. Hart—*D. C. Heath*, 124 p., \$2.00

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Geology

THE GEOLOGY OF THE ROVE FORMATION AND ASSOCIATED INTRUSIVES IN NORTHEASTERN MINNESOTA—F. F. Grout and G. M. Schwartz—*Univ. of Minnesota Press*, 103 p., 20 folded maps, \$2.

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General Science

TRANSACTIONS OF THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS, Vol. XXVIII, 401 p., \$3.

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Library Science

THE LIBRARY AND ITS HOME—Ed. By Gertrude Gilbert Drury—*Wilson*, 588 p., \$2.75. Reprints of contemporary articles and addresses, discussing problems which library builders have faced. Many of these, such as the development of the "Stack," and the relation of cost to service, apply to nearly all libraries. It is a book which all libraries should have, as an aid to expansion and as inspiration for future development.

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General Science—Biology

HUXLEY MEMORIAL LECTURES, 1925-1932—E. B. Poulton and others—*Macmillan*, 172 p., \$1.10. These seven lec-

tures, for the most part, use Huxley's contributions to science as a theme and they will be particularly interesting to anyone concerned with the history of evolution. The lectures are by Prof. E. B. Poulton, Sir Peter Chalmers-Mitchell, Prof. G. Elliot Smith, Prof. F. O. Bower, Dr. Graham Wallas, Sir Arthur Smith Woodward and Aldous Huxley.

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Ethnology

INDIAN TRIBES OF THE SOUTHWEST—Mrs. White Mountain Smith—*Stanford Univ. Press*, 146 p., \$1.50. Four college girls spent a summer traveling from one Indian reservation to another under the guidance of the author, who has many Indian friends. The next best thing to taking a trip like that, under such skilful guidance, is reading about it, especially when the guide describes Indian life as interestingly as Mrs. Smith does.

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Physiology—Physics

LIFE-GIVING LIGHT—Charles Sheard—*Williams & Wilkins*, 174 p., \$1. This story of light as related to life is by the director of biophysical research of the Mayo Foundation. Much pseudo-science has been written about the therapeutic value of light and as an antidote the layman desiring information cannot do better than read this authoritative volume in the Century of Progress Series.

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Astronomy

MAKERS OF ASTRONOMY—Hector MacPherson—*Oxford University Press*, 244 p., \$2.50. The rise of astronomy is told in a series of biographical sketches which are blended into appropriate chapters. The book provides a pleasing introduction to the important personalities in astronomy from the time of Copernicus to the present day.

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Aeronautics—Navigation

SIMPLIFIED AERIAL NAVIGATION—J. A. McMullen—*Lippincott*, 104 p., \$2. A British manual giving methods of aerial navigation by dead reckoning.

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Anthropology

JOCASTA'S CRIME—Lord Rag' Dutton, 215 p., \$2.25. An anthropological study of incest, from the point of view of mythology, eugenics, primitive society, early man, Freudianism and other aspects. Considering the origin of incest taboo, the author disposes of reason, instinct, and religion, and argues in favor of the theory that incest is shunned in primitive society because it is "unlucky."

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Archaeology

ARCHAEOLOGY OF NORTH AMERICA—Paul S. Martin—*Field Museum of Natural History*, 122 p., 50c. Written primarily as a guide book to the Hall of North American Archaeology in the Field Museum, this little book is really a very good introduction to Indian culture for any one to read.

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Chemistry

TRAITÉ DE CHIMIE ORGANIQUE—A. E. Tchitchibabine—*Hermann & Cie.*, Paris, 2 vol., 1022 p., 220 French francs. A French translation of a textbook of organic chemistry which has had four editions in the Soviet Union in the last seven years.

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Botany

ELEMENTS OF BOTANY—R. M. Holman and W. W. Robbins—*Wiley*, 404 p., \$2.75. Second edition of a successful text for university students.

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Chemistry

ANNUAL REVIEW OF BIOCHEMISTRY, Vol. II—James Murray Luck, Editor—*Stanford University Press*, 564 p., \$5. A comprehensive and useful summary of recent progress in the various fields of biochemistry. Almost 3,000 papers in 25 different fields have actually been reviewed by the specialists who handle the various sections and yet the statement is made that this represents less than half the papers of sufficient merit and weight to deserve treatment. On vitamins alone no less than 1,000 papers published in the past year.

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